**Mark each item as True or False (2 pts each)**

\_\_\_\_F\_\_\_\_ 1. Leading zeros are always considered significant.

\_\_\_\_T\_\_\_\_ 2. Non-zero integers are always considered significant.

\_\_\_\_F\_\_\_\_ 3. 3.4 x 10-3 = 3.4000

\_\_\_\_T\_\_\_\_ 4. 5.5 x 109 = 5,500,000,000

**Give the names of the following: (2 pts each)**

5. P2Cl5 \_\_\_\_diphosphorous pentachloride\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

6. Na2CO3 \_\_sodium carbonate\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

7. CaCl2 \_\_calcium chloride\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

8. CI4 \_\_\_carbon tetraiodide\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

9. AlCl3●6H2O \_aluminum chloride hexahydrate\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

10. MgSO4●7H2O \_\_magnesium sulfate heptahydrate\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

11. HBr \_\_hydrobromic acid\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

12. H3PO4 \_\_phosphoric acid\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

**Write the formula for the following: (2 pts each)**

13. sulfur difluoride \_\_\_SF2\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

14. dinitrogen tetroxide \_\_\_N2O4\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

15. sodium phosphate \_\_Na3PO4\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

16. iron (III) oxide \_Fe2O3\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

**Write the empirical formula for and then name the following (4 pts each)**

**Empirical Formula Compound Name**

17. Mg2+, NO3- \_Mg(NO3)2\_\_\_ \_\_\_magnesium nitrate\_\_\_\_\_\_\_\_\_

18. Pb2+, S2- \_\_\_\_PbS\_\_\_\_\_\_\_\_\_\_ \_\_\_\_\_\_lead sulfide\_\_\_\_\_\_\_\_\_\_\_

**Draw the Lewis dot structure for the following: (4 pts each)**

19. Phosphorus 20. Bromine

21. CH4 22. CO2

**23. Explain the differences between ionic and covalent bonding and compounds. Draw a diagram(s) or picture(s) showing how the atoms interact in each type of compound. (20 pts)**

Ionic: Atoms transfer electrons (gain or lose) to one another to fulfill their octet forming ions (cations formed by losing electrons and have positive charge, anions formed by gaining electrons and have negative charge). Bonding occurs by the attraction between positive and negative ions. Compounds are crystalline lattice, solid. Chemical formula is the empirical formula since the compound is not individual molecules, empirical formula represents ratio of cation to anion. Ionic compounds conduct electricity, conduct heat, dissolve in water, have high melting points. Formed between metal & nonmetal

Covalent: Atoms share electrons so that each atom in a bond fulfills its own octet. Each bond is formed by a pair of shared electrons. Can have single, double or triple bonds. Covalent compounds can be solid, liquid, gas. Some dissolve in water, but most only dissolve in oil (if at all), does not conduct electricity, have low melting points. Between nonmetals only.

Appropriate pictures: Lewis dot structures of a covalent bond, an atom becoming an ion, a lattice structure, etc, any 2 pictures so that one demonstrates ionic compounds/bonding and one demonstrates covalent bonds/compounds

**24. Suppose you are given a sample of an unknown hydrate. Describe how you would find out how much water was bound in the hydrate. Be specific! (10 pts)**

Steps must include getting an accurate initial weight, including how to account for vessel. Noting initial appearance of sample. Heating sample to see water vapor released for at least 25 minutes, until no more visible change is occurring. Note final appearance. Determine final mass of sample (accounting for vessel), and doing so quickly to prevent new water absorption. Determine mass of water removed by subtracting final weight from initial weight. Determine % water by mass (water mass/initial mass)\*100%

**25. Explain the difference between single, double, and triple covalent bonds. (5 pts)**

Each bond is a sharing of electrons between two atoms due to the nature of being covalent. Single bonds occur when there is 1 pair of shared electrons, double bonds occur when there is 2 pairs of shared electrons, and triple bonds occur when there is 3 pairs of shared electrons.

**26. Explain the octet rule including the significance of the Noble Gasses and the main exception to the rule. (10 pts)**

The octet rule states that atoms tend to gain, lose, or share electrons in order to get a complete set of 8 valence electrons. To maintain a neutral charge, the ions bond with one another. The noble gasses already have 8 electrons in their valence shell so they do not form bonds. The main exception to the rule is Hydrogen & Helium which only need 2 electrons.